

Date: Friday, 05/12/2008 12:46:04 PM
 User: Julie Dawson

Process Sheet

| | |
|---|--|
| Customer : CU-DAR001 Dart Helicopters Services | Drawing Name : HIGH AFT X-TUBE 412 |
| Job Number : 43928 | |
| Estimate Number : 10559 | |
| P.O. Number : | Part Number : D412664203 |
| This Issue : 05/12/2008 S.O. No. : | Drawing Number : D412-664-243 REV D |
| Prsht Rev. : NC | Project Number : N/A |
| First Issue : // Type : CROSSTUBES | Drawing Revision : D |
| Previous Run : 42064 | Material : |
| Written By : | Due Date : 12/12/2008 Qty: 1 Um: Each |
| Checked & Approved By : <u>Jul 08 12.05</u> | |
| Comment : Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM Est Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC | |

Additional Product

Job Number:



| Seq. #: | Machine Or Operation: | Description : |
|---------|-----------------------|---------------|
|---------|-----------------------|---------------|

| | | |
|-----|----|------------------|
| 1.0 | DC | DOCUMENT CONTROL |
|-----|----|------------------|

**Comment:** DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

502/01/07

| | | |
|-----|-------------|-----------------------|
| 2.0 | PACKAGING 1 | PACKAGING RESOURCE #1 |
|-----|-------------|-----------------------|

**Comment:** PACKAGING RESOURCE #1

| | | |
|-----|---------------|--------------------------|
| 3.0 | D412664203TRN | Crosstube Turning Detail |
|-----|---------------|--------------------------|

**Comment:** Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch B-42277

MB

08-12-15

| | | |
|-----|---------|-----------------------------|
| 4.0 | BENDING | BENDING MACHINE - SKIDTUBES |
|-----|---------|-----------------------------|

**Comment:** BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

08-12-15

| | | |
|-----|------|------------------------------|
| 5.0 | QC15 | DIMENSIONAL CHECK OF X-TUBES |
|-----|------|------------------------------|

**Comment:** DIMENSIONAL CHECK OF X-TUBES

08-12-15

| W/O: | | WORK ORDER CHANGES | | | | | |
|------|------|--------------------|----|------|-----|-----------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | By | Date | Qty | Approval Chief Eng Prod Mgr | Approval QC Inspector |
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 43928

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description:

6.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551

2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Debur & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243

MB
08-12-16

MB
08-12-16

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

MB
08-12-16

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

S 08/12/17 *(XO)*

9.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

S 08/12/17 *(XO)*

10.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038 Or

Issue P/O: 7874 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

C2081121190

11.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

P2/14/17

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|--|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 43928

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description :

19.0

MS2192028

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch

4 MS21920-28 Clamp 109181

RT 09-01-05

20.0

MS2192030

clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: 107545

RT 09-01-05

21.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

Assemble as per Dwg D412-664-203

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond Batch: 109900

Expiry Date: 09-08-01

RT 09-01-05

3-Install clamps as per Dwg D212-664-203 using installaiton jig DT9024 with 0.010 thick brass shims on both chafing sheild (D3189-1). Torque clamps to 80-100 in lb.

22.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

5 09/01/06 (P)

23.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|--|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 43928

Part Number: D412664203

Job Number:



| Seq. #: | Machine Or Operation: | Description : |
|---------|-----------------------|---------------|
|---------|-----------------------|---------------|

| | | |
|------|--------|------|
| 24.0 | AN640A | Bolt |
|------|--------|------|



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)
Bolt
Batch: 108940

SS

09/01/06

(X)

| | | |
|------|--------|------|
| 25.0 | AN641A | Bolt |
|------|--------|------|



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)
Bolt
Batch: 107013

SS

09/01/06

(X)

| | | |
|------|------------|--------|
| 26.0 | AN960JD616 | Washer |
|------|------------|--------|



Comment: Qty.: 18.0000 Each(s)/Unit Total: 18.0000 Each(s)
Washer
Batch: M19371

SS

09/01/06

(X)

| | | |
|------|-----------|-----|
| 27.0 | MS21042L6 | Nut |
|------|-----------|-----|



Comment: Qty.: 6.0000 Each(s)/Unit Total: 6.0000 Each(s)
Nut
Batch: M19099

SS

09/01/06

(X)

| | | |
|------|-----|------------------------------------|
| 28.0 | QC4 | INSPECT 100% KITS FOR COMPLETENESS |
|------|-----|------------------------------------|



Comment: INSPECT 100% KITS FOR COMPLETENESS

SS

09/01/07

(X)

| | | |
|------|-------------|-----------------------|
| 29.0 | PACKAGING 1 | PACKAGING RESOURCE #1 |
|------|-------------|-----------------------|



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date

Time & date of packaging: 8:00am 09/01/07

Location: _____
PPP Rev: G

9/1/07

SS

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|--|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 43928

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description :

30.0

QC21

FINAL INSPECTION/W/O RELEASE



①

Comment: FINAL INSPECTION/W/O RELEASE

09/01/07

Job Completion



U 09-01-07

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|--|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE | | By | Date | Qty | Approval Chief Eng / Prod Mgr | Approval QC Inspector |
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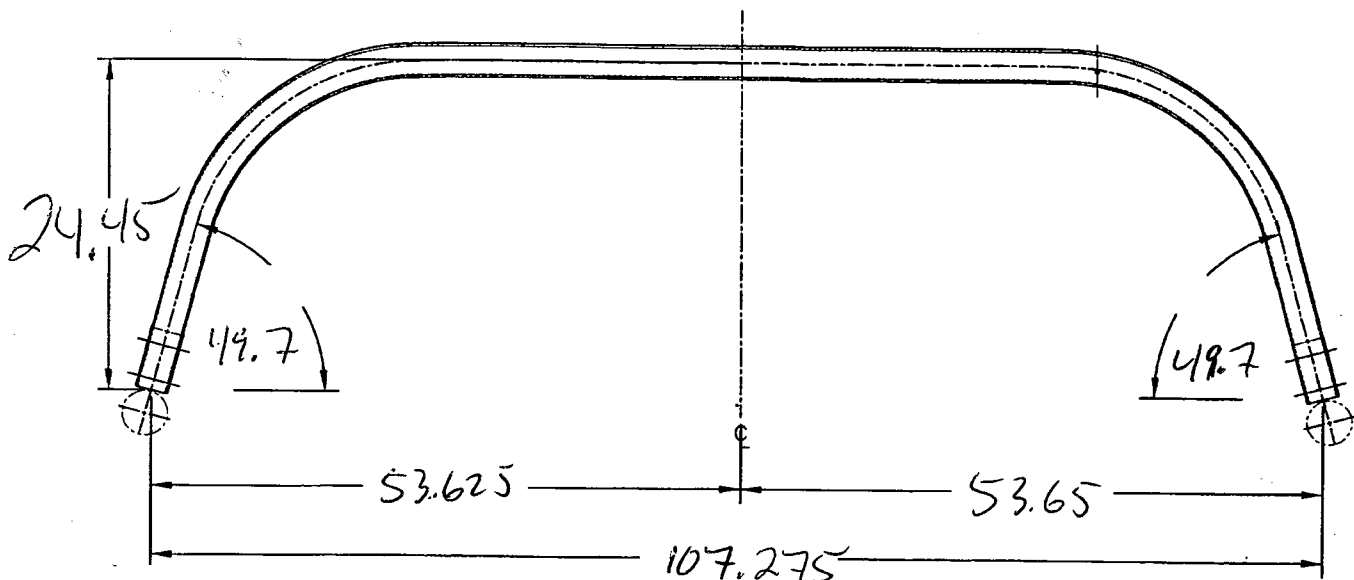
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

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|---|----------------------------------|
| DART AEROSPACE LTD | Work Order: 43928 |
| Description: Crosstube High Aft (412) | Part Number: D412-664-203 |
| Inspection Dwg: D412-664-243 Rev: D | Page 1 of 1 |

| Required Dimension | Min | Max |
|--------------------|--------|--------|
| Height | 24.24 | 24.50 |
| 1/2 Span | 53.59 | 53.85 |
| Angle | 49 | 52 |
| Total Span | 107.18 | 107.70 |



| Comments |
|----------|
| |
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| |
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| | |
|-----------------|--------------------------------|
| QC15 Inspection | <i>[Signature]</i> 06-12-15 |
| Date | |

| Rev | Date | Change | Revised by | Approved |
|-----|----------|-----------------------------------|---------------------------|--------------------|
| A | 07.02.06 | New Issue | KJ/JM | <i>[Signature]</i> |
| B | 07.05.08 | Dimensions updated per Dwg rev. D | KJ/JLM <i>[Signature]</i> | |

| W/O: | | WORK ORDER CHANGES | | | | | | |
|------|------|--------------------|--|----|------|-----|-------------------------------------|--------------------------|
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

DART

| | | | |
|---------------------|-----------------------|---|------------------------|
| DESIGN PH | DRAWN BY PH | DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA | |
| CHECKED Q | APPROVED PH | DRAWING NO. D412-664-243 | REV. D SHEET 1 OF 3 |
| DATE 07.03.09 | | TITLE CROSSTUBE ASSEMBLY (412 HI AFT) NTS | |
| A | 01.10.17 | NEW ISSUE | |
| B | 05.02.04 | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES | |
| C | 06.10.27 | REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30 | |
| D | 07.03.09 | REMOVE D2732-058, CHANGE TO D3595-063-570 | |

RELEASE

07.04.24

| Qty | Part Number | Description |
|-----|----------------|---|
| X | D412-664-243 | CROSSTUBE ASSEMBLY (412 HIGH AFT) |
| 1 | D6009-129 | CROSSTUBE |
| 2 | D3595-063-570 | RUBBER CUSHION |
| 1 | D2896-1 | SUPPORT |
| 2 | D2856-600-1009 | ABRASION STRIP |
| 4 | MS21920-28 | CLAMP |
| 2 | MS21920-30 | CLAMP (OR MS21920-32) |
| 2 | D3189-1 | CHAFING SHIELD |
| A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE) |

GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.09±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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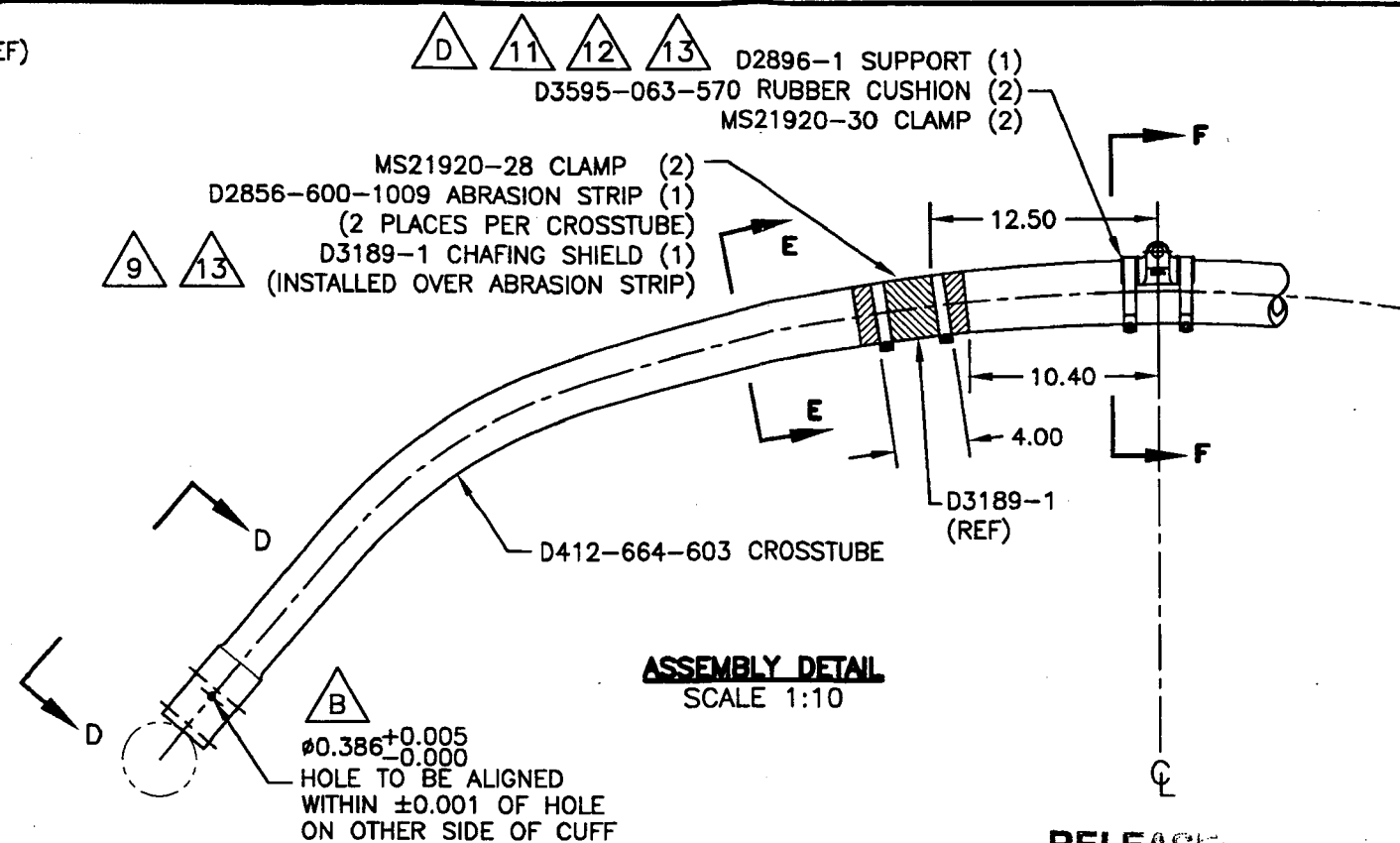
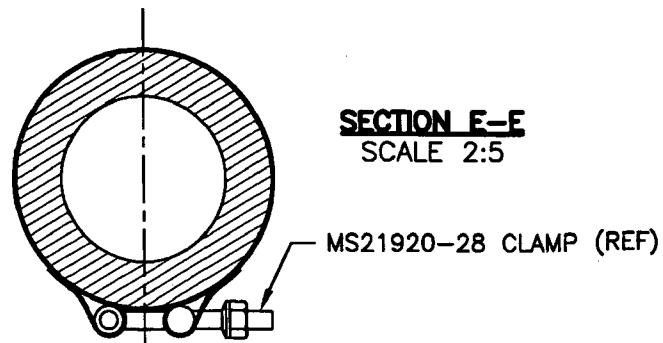
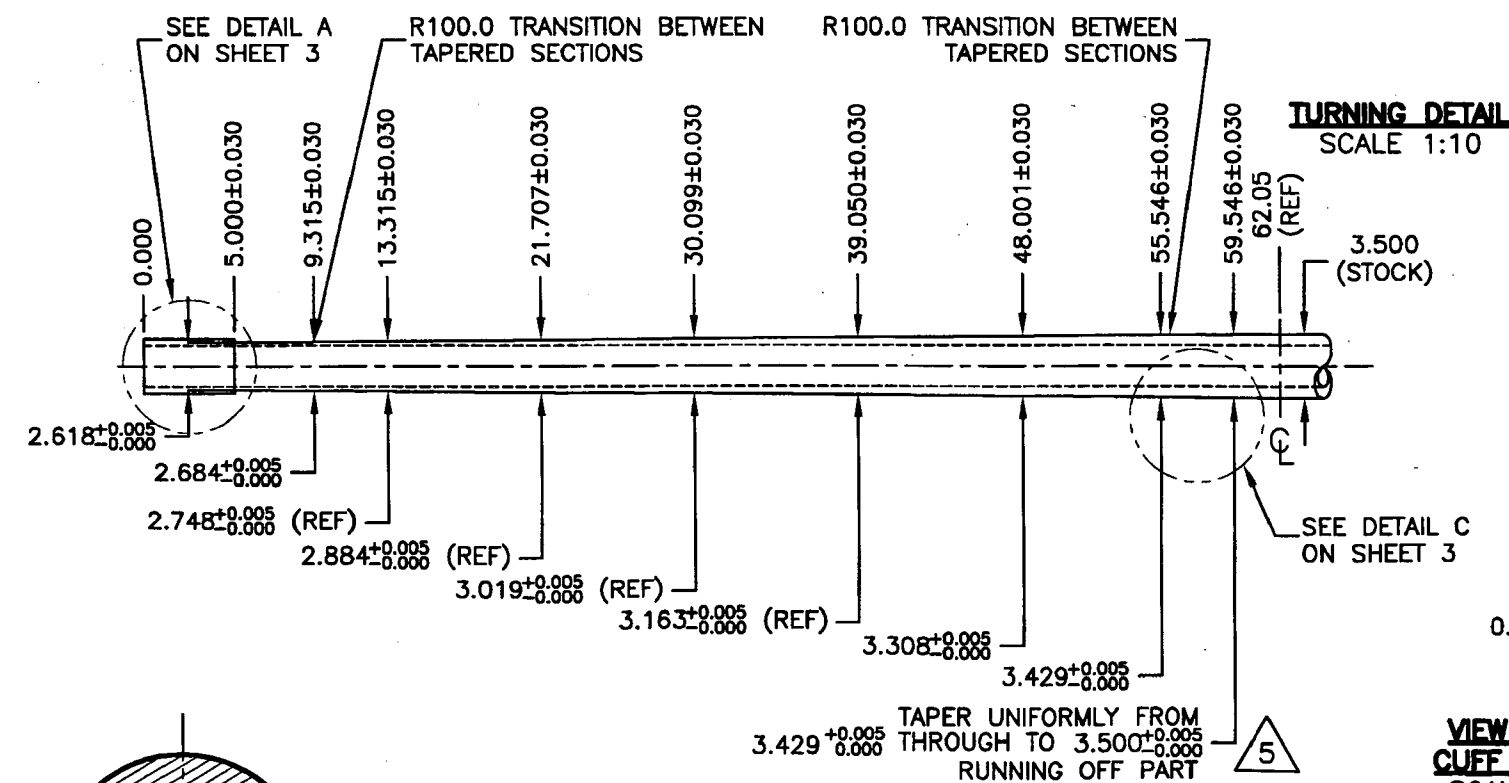
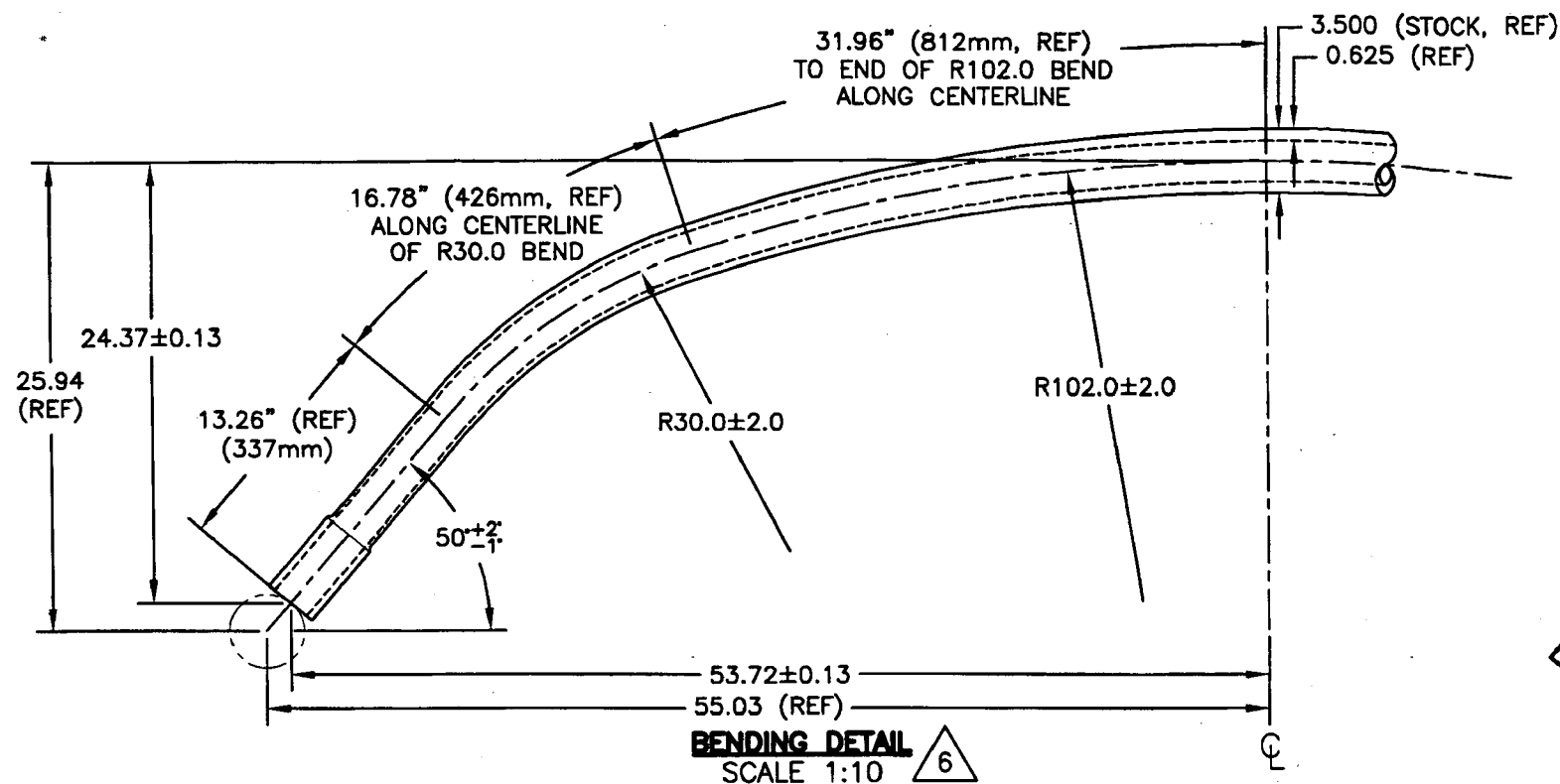
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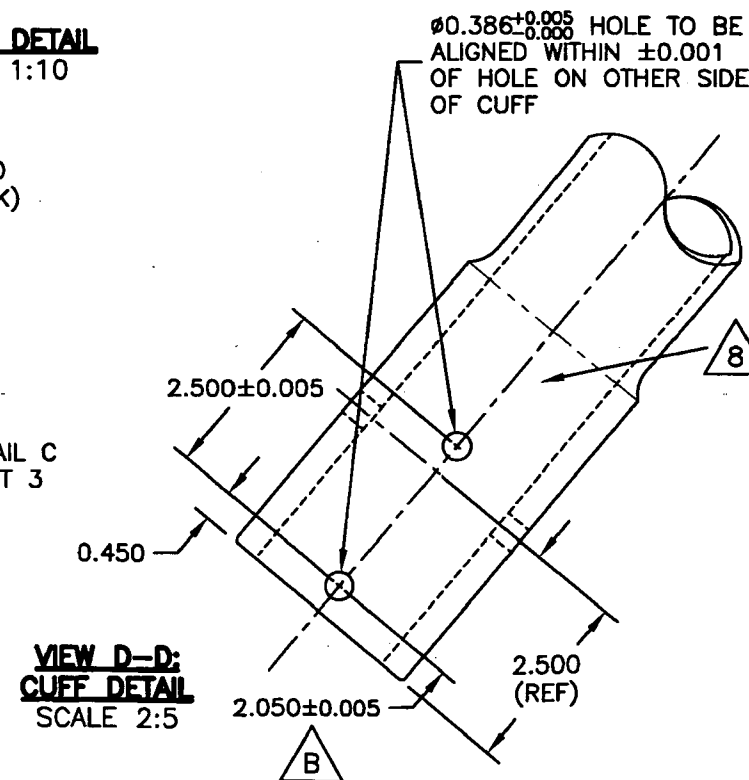
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

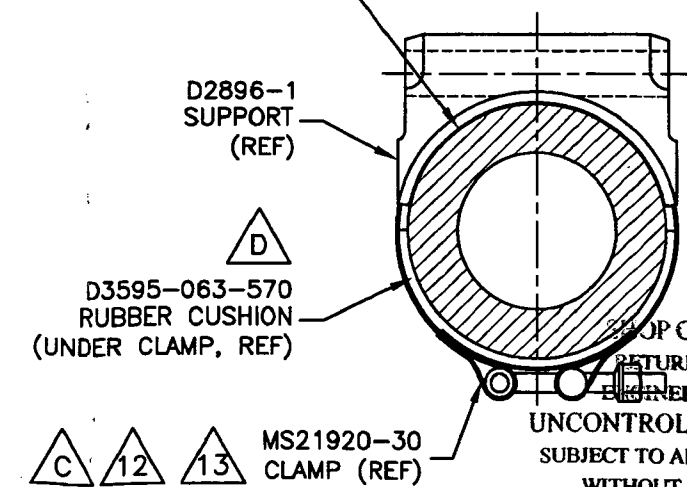


RELEASE
07.04.24



SECTION F-F
SCALE 2:5

APPLY MAGNOBOND BETWEEN D2896-1 AND THE CROSSTUBE

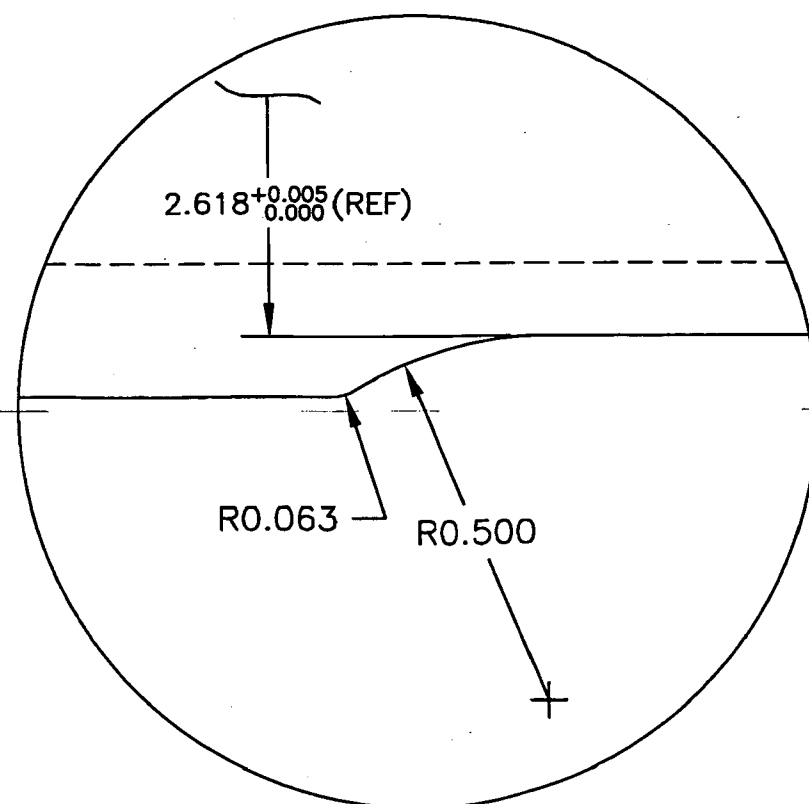
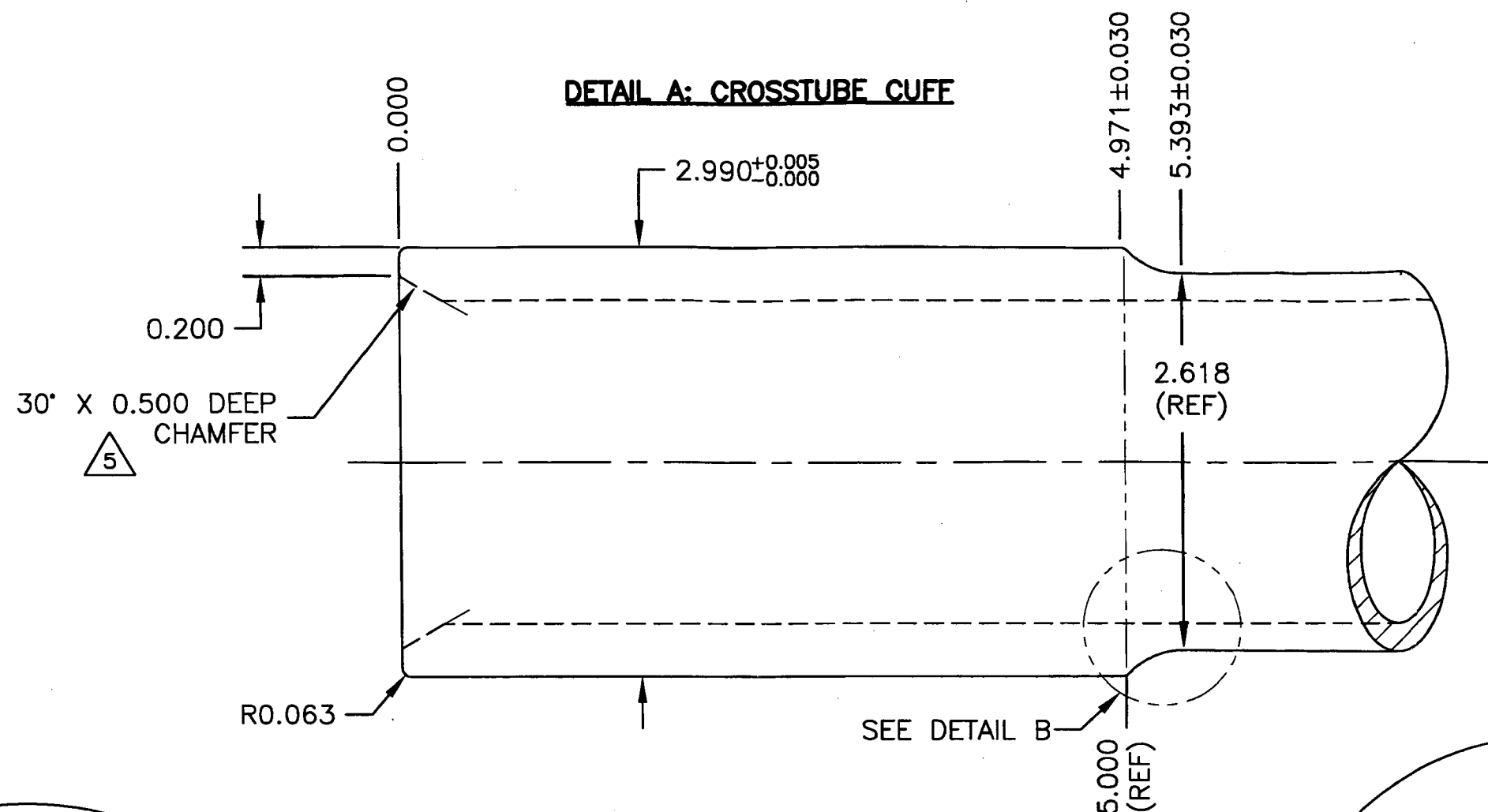


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| | | DATE | 07.03.09 | TITLE | | CROSSTUBE ASSEMBLY (412 HI AFT) | SCALE 1:10 |

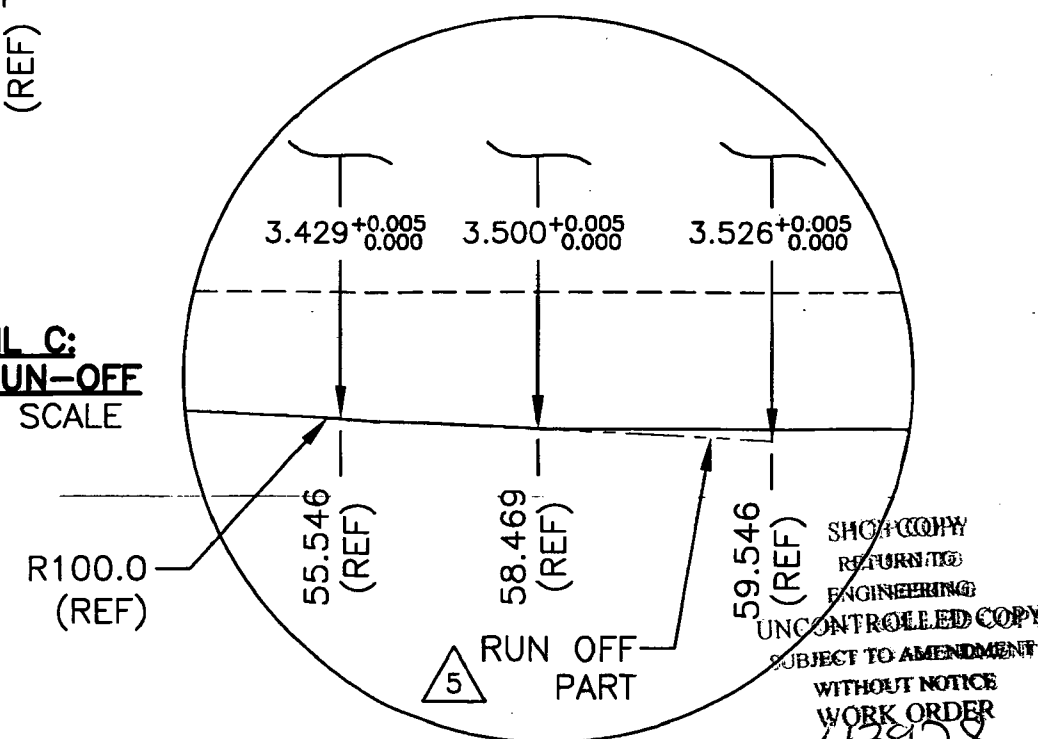
RELEASED
07-04-244
PER ECN 887

DETAIL A: CROSSTUBE CUFF



**DETAIL B: CUFF
TRANSITION**
SCALE 4:1

**DETAIL C:
TAPER RUN-OFF**
NOT TO SCALE



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APPROVED

DATE

07.03.09

DART

DART AEROSPACE LTD.
HAMMERSBURY, ONTARIO, CANADA

DRAWING NO.
D412-664-243

REV. D
SHEET 3 OF 3

TITLE
CROSSTUBE ASSEMBLY (412 HI AFT)

SCALE
1:1



LIQUID PENETRANT TEST REPORT

P- 09134

PAGE 1 OF 1

CLIENT Dart Aerospace DATE Dec 16, 08 TIME AM ☐ PM ☐
ATTENTION Linda Lacelle ACUREN JOB NO. 188-08-1656
ADDRESS 1270 Aberdeen St. POWO No. 7874
Hawkesbury, Ont. K6A 1K7 WORK LOCATION Hawkesbury
ACCEPTANCE STD. ASTM 1417/Q51-03B REV./DATE 2005
PROJECT 206 L AFT-X-TUBE, High AFT XTUBE 412, 212/205 HIGH FED X-TUBE ASSEMBLY
ITEM(S) EXAMINED Sob's : 43494, 43475, 43928, 43929, 44133, 44136

JOB DESCRIPTION PROCEDURE NO. LT-~~0003~~ REV./DATE TECHNIQUE NO. LT-~~0003~~ REV./DATE
PART NO. D306667203BL, D412664203, D312664101 MATERIAL ALODINE ALUM. THICKNESS
SCOPE WET FLOURESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON
100% EXTERNAL SURFACE

TEST DETAILS

METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 8171 ☐ OUTPUT > 1000 μ W/cm² ☐ AMBIENT < 2 fc
PENETRANT MINIMUM DWELL TIME 30 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER H₂O MINIMUM DRY TIME >10 MIN. OTHER CAL FEB 09
DEVELOPER SKD52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N CAL DUE DATE
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE

SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ☐ METRIC ☐ IMPERIAL

| ITEM | COMMENTS | ACCEPT | REJECT |
|--------|----------|--------|--------|
| 13475: | | ✓ | |
| 13474: | | ✓ | |
| 13928: | | ✓ | |
| 13929: | | ✓ | |
| 14133: | | ✓ | |
| 14136: | | ✓ | |

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE Eric Downing SIGNATURE [Signature] DTR #
TECHNICIAN (SIGNATURE): FREDERICK CHACNON SIGNATURE [Signature] REPORT REVIEWED BY:
NAME (PRINT): FREDERICK CHACNON 1ST TECHNICIAN 2ND TECHNICIAN
CGSB LEVEL II SNT LEVEL II CGSB LEVEL II SNT LEVEL II
CGSB REG. NO. 10560 CGSB REG. NO. 10560

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

Date: Tuesday, 06/01/2009 10:26:37 AM
User: Julie Dawson

Process Sheet

| | | | |
|----------------------------------|--|-------------------------|-----------------------|
| Customer | : CU-DAR001 Dart Helicopters Services | Drawing Name | : HIGH AFT X-TUBE 412 |
| Job Number | : 43928 | | |
| Estimate Number | : 10559 | | |
| P.O. Number | : | Part Number | : D412664203 |
| This Issue | : 06/01/2009 | S.O. No. | : |
| Prsht Rev. | : NC | Drawing Number | : D412-664-243 REV D |
| First Issue | : 05/12/2008 | Project Number | : N/A |
| Previous Run | : 42064 | Drawing Revision | : D |
| | Type | Material | : |
| | : CROSSTUBES | Due Date | : 12/12/2008 |
| Written By | : | Qty: | 1 |
| Checked & Approved By | : | Um: | Each |
| Comment | : Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM Est Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC | | |

Additional Product

Job Number:



| | | |
|----------------|------------------------------|----------------------|
| Seq. #: | Machine Or Operation: | Description : |
|----------------|------------------------------|----------------------|

| | | |
|-----|----|------------------|
| 1.0 | DC | DOCUMENT CONTROL |
|-----|----|------------------|



Handwritten: 320 8601.06



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

| | | |
|-----|-------------|-----------------------|
| 2.0 | PACKAGING 1 | PACKAGING RESOURCE #1 |
|-----|-------------|-----------------------|



Comment: PACKAGING RESOURCE #1

| | | |
|-----|---------------|--------------------------|
| 3.0 | D412664203TRN | Crosstube Turning Detail |
|-----|---------------|--------------------------|



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)
CROSSTUBE TURNING DETAIL
batch _____

Job Completion

